

# claims:

## 1. An isolated polynucleotide that encodes:

(i) a polypeptide comprising an amino acid sequence that is homologous to the amino acid sequence of a *Helicobacter* polypeptide, wherein said amino acid sequence of said *Helicobacter* polypeptide is selected from the group consisting of GHPO 35 (SEQ ID NO:2), GHPO 55 (SEQ ID NO:4), GHPO 78 (SEQ ID NO:6), GHPO 89 (SEQ ID NO:8), GHPO 129 (SEQ ID NO:10), GHPO 541 (SEQ ID NO:12), GHPO 607 (SEQ ID NO:14), GHPO 635 (SEQ ID NO:16), GHPO 701 (SEQ ID NO:18), GHPO 712 (SEQ ID NO:20), GHPO 761 (SEQ ID NO:22), GHPO 838 (SEQ ID NO:24), GHPO 1034 (SEQ ID NO:26), GHPO 1085 (SEQ ID NO:28), GHPO 1213 (SEQ ID NO:30), GHPO 1255 (SEQ ID NO:32), GHPO 1308 (SEQ ID NO:34), GHPO 1389 (SEQ ID NO:36), GHPO 1706 (SEQ ID NO:38), GHPO 234 (SEQ ID NO:40), GHPO 314 (SEQ ID NO:42), GHPO 510 (SEQ ID NO:44), GHPO 603 (SEQ ID NO:46), GHPO 937 (SEQ ID NO:48), GHPO 1027 (SEQ ID NO:50), GHPO 1099 (SEQ ID NO:52), GHPO 1151 (SEQ ID NO:54), GHPO 1275 (SEQ ID NO:56), GHPO 1365 (SEQ ID NO:58), GHPO 1578 (SEQ ID NO:60), GHPO 22 (SEQ ID NO:62), GHPO 58 (SEQ ID NO:64), GHPO 200 (SEQ ID NO:66), GHPO 558 (SEQ ID NO:68), GHPO 563 (SEQ ID NO:70), GHPO 695 (SEQ ID NO:72), GHPO 699 (SEQ ID NO:74), GHPO 702 (SEQ ID NO:76), GHPO 709 (SEQ ID NO:78), GHPO 741 (SEQ ID NO:80), GHPO 762 (SEQ ID NO:82), GHPO 827 (SEQ ID NO:84), GHPO 852 (SEQ ID NO:86), GHPO 1013 (SEQ ID NO:88), GHPO 1020 (SEQ ID NO:90), GHPO 1031 (SEQ ID NO:92), GHPO 1052 (SEQ ID NO:94), GHPO 1127 (SEQ ID NO:96), GHPO 1149 (SEQ ID NO:98), GHPO 1176 (SEQ ID NO:100), GHPO 1250 (SEQ ID NO:102), GHPO 1312 (SEQ ID NO:104), GHPO 1358 (SEQ ID NO:106), GHPO 1490 (SEQ ID NO:108), GHPO 1559 (SEQ ID NO:110), GHPO 1651 (SEQ ID NO:112), GHPO 1726 (SEQ ID NO:114), GHPO 1780 (SEQ ID NO:116), GHPO 895 (SEQ ID NO:118), GHPO 1447 (SEQ ID NO:120), GHPO 28 (SEQ ID NO:122), GHPO 86 (SEQ ID NO:124), GHPO 155 (SEQ ID NO:126), GHPO 157 (SEQ ID NO:128), GHPO 237 (SEQ ID NO:130), GHPO 290 (SEQ ID NO:132), GHPO 293 (SEQ ID NO:134), GHPO 335 (SEQ ID NO:136), GHPO 374 (SEQ ID

NO:138), GHPO 442 (SEQ ID NO:140), GHPO 480 (SEQ ID NO:142), GHPO 523  
(SEQ ID NO:144), GHPO 610 (SEQ ID NO:146), GHPO 675 (SEQ ID NO:148), GHPO  
690 (SEQ ID NO:150), GHPO 829 (SEQ ID NO:152), GHPO 850 (SEQ ID NO:154),  
GHPO 876 (SEQ ID NO:156), GHPO 984 (SEQ ID NO:158), GHPO 989 (SEQ ID  
5 NO:160), GHPO 1111 (SEQ ID NO:162), GHPO 1145 (SEQ ID NO:164), GHPO 1256  
(SEQ ID NO:166), GHPO 1264 (SEQ ID NO:168), GHPO 1316 (SEQ ID NO:170),  
GHPO 1368 (SEQ ID NO:172), GHPO 1442 (SEQ ID NO:174), GHPO 1506 (SEQ ID  
NO:176), GHPO 1543 (SEQ ID NO:178), GHPO 1574 (SEQ ID NO:180), GHPO 1627  
(SEQ ID NO:182), GHPO 1657 (SEQ ID NO:184), GHPO 1664 (SEQ ID NO:186),  
10 GHPO 1694 (SEQ ID NO:188), GHPO 1704 (SEQ ID NO:190), GHPO 1763 (SEQ ID  
NO:192), GHPO 616 (SEQ ID NO:194), GHPO 76 (SEQ ID NO:196), GHPO 109 (SEQ  
ID NO:198), GHPO 163 (SEQ ID NO:200), GHPO 169 (SEQ ID NO:202), GHPO 208  
(SEQ ID NO:204), GHPO 219 (SEQ ID NO:206), GHPO 445 (SEQ ID NO:208), GHPO  
479 (SEQ ID NO:210), GHPO 525 (SEQ ID NO:212), GHPO 535 (SEQ ID NO:214),  
15 GHPO 731 (SEQ ID NO:216), GHPO 836 (SEQ ID NO:218), GHPO 879 (SEQ ID  
NO:220), GHPO 881 (SEQ ID NO:222), GHPO 886 (SEQ ID NO:224), GHPO 893  
(SEQ ID NO:226), GHPO 894 (SEQ ID NO:228), GHPO 976 (SEQ ID NO:230), GHPO  
1011 (SEQ ID NO:232), GHPO 1024 (SEQ ID NO:234), GHPO 1084 (SEQ ID NO:236),  
GHPO 1329 (SEQ ID NO:238), GHPO 1330 (SEQ ID NO:240), GHPO 1346 (SEQ ID  
20 NO:242), GHPO 1360 (SEQ ID NO:244), GHPO 1388 (SEQ ID NO:246), GHPO 1411  
(SEQ ID NO:248), GHPO 1419 (SEQ ID NO:250), GHPO 1446 (SEQ ID NO:252),  
GHPO 1469 (SEQ ID NO:254), GHPO 1501 (SEQ ID NO:256), GHPO 1505 (SEQ ID  
NO:258), GHPO 1522 (SEQ ID NO:260), GHPO 1525 (SEQ ID NO:262), GHPO 1615  
(SEQ ID NO:264), GHPO 1689 (SEQ ID NO:266), GHPO 1733 (SEQ ID NO:268),  
25 GHPO 18 (SEQ ID NO:270), GHPO 139 (SEQ ID NO:272), GHPO 142 (SEQ ID  
NO:274), GHPO 250 (SEQ ID NO:276), GHPO 257 (SEQ ID NO:278), GHPO 325  
(SEQ ID NO:280), GHPO 355 (SEQ ID NO:282), GHPO 357 (SEQ ID NO:284), GHPO  
454 (SEQ ID NO:286), GHPO 475 (SEQ ID NO:288), GHPO 515 (SEQ ID NO:290),

GHPO 527 (SEQ ID NO:292), GHPO 551 (SEQ ID NO:294), GHPO 602 (SEQ ID NO:296), GHPO 626 (SEQ ID NO:298), GHPO 646 (SEQ ID NO:300), GHPO 653 (SEQ ID NO:302), GHPO 655 (SEQ ID NO:304), GHPO 670 (SEQ ID NO:306), GHPO 739 (SEQ ID NO:308), GHPO 798 (SEQ ID NO:310), GHPO 1102 (SEQ ID NO:312),  
5 GHPO 1114 (SEQ ID NO:314), GHPO 1152 (SEQ ID NO:316), GHPO 1272 (SEQ ID NO:318), GHPO 1345 (SEQ ID NO:320), GHPO 1377 (SEQ ID NO:322), GHPO 1424 (SEQ ID NO:324), GHPO 1430 (SEQ ID NO:326), GHPO 1502 (SEQ ID NO:328), GHPO 1600 (SEQ ID NO:330), GHPO 1714 (SEQ ID NO:332), GHPO 359 (SEQ ID NO:334), GHPO 678 (SEQ ID NO:336), GHPO 708 (SEQ ID NO:338), GHPO 759  
10 (SEQ ID NO:340), GHPO 847 (SEQ ID NO:342), GHPO 1050 (SEQ ID NO:344), GHPO 1101 (SEQ ID NO:346), GHPO 1120 (SEQ ID NO:348), GHPO 1138 (SEQ ID NO:350), GHPO 1310 (SEQ ID NO:352), GHPO 1320 (SEQ ID NO:354), GHPO 1375 (SEQ ID NO:356), GHPO 1432 (SEQ ID NO:358), GHPO 21 (SEQ ID NO:360), GHPO 282 (SEQ ID NO:362), GHPO 1089 (SEQ ID NO:364), GHPO 1141 (SEQ ID NO:366),  
15 GHPO 1280 (SEQ ID NO:368), and GHPO 1608 (SEQ ID NO:370); or  
(ii) a derivative of said polypeptide encoded by said polynucleotide.

2. The isolated polynucleotide of claim 1, which encodes a mature form of said polypeptide.

3. The isolated polynucleotide of claim 1, wherein the polynucleotide is a DNA molecule.

4. The isolated polynucleotide of claim 1, which is a DNA molecule that can be amplified and/or cloned by polymerase chain reaction from a *Helicobacter* genome, using either a 5' oligonucleotide primer and a 3' oligonucleotide primer having sequences as shown in the table.

5. The isolated DNA molecule of claim 4, which can be amplified or cloned by the polymerase chain reaction from a *Helicobacter pylori* genome.
6. The isolated polynucleotide of claim 1, which is a DNA molecule that encodes the mature form or a derivative of a polypeptide encoded by the DNA molecule of claim 4.
7. The isolated polynucleotide of claim 1, which is a DNA molecule that encodes the mature form or a derivative of a polypeptide encoded by the DNA molecule of claim 5.
8. A compound, in a substantially purified form, that is the mature form or a derivative of a polypeptide comprising an amino acid sequence that is homologous to a *Helicobacter* amino acid sequence that is selected from the group consisting of GHPO 35 (SEQ ID NO:2), GHPO 55 (SEQ ID NO:4), GHPO 78 (SEQ ID NO:6), GHPO 89 (SEQ ID NO:8), GHPO 129 (SEQ ID NO:10), GHPO 541 (SEQ ID NO:12), GHPO 607 (SEQ ID NO:14), GHPO 635 (SEQ ID NO:16), GHPO 701 (SEQ ID NO:18), GHPO 712 (SEQ ID NO:20), GHPO 761 (SEQ ID NO:22), GHPO 838 (SEQ ID NO:24), GHPO 1034 (SEQ ID NO:26), GHPO 1085 (SEQ ID NO:28), GHPO 1213 (SEQ ID NO:30), GHPO 1255 (SEQ ID NO:32), GHPO 1308 (SEQ ID NO:34), GHPO 1389 (SEQ ID NO:36), GHPO 1706 (SEQ ID NO:38), GHPO 234 (SEQ ID NO:40), GHPO 314 (SEQ ID NO:42), GHPO 510 (SEQ ID NO:44), GHPO 603 (SEQ ID NO:46), GHPO 937 (SEQ ID NO:48), GHPO 1027 (SEQ ID NO:50), GHPO 1099 (SEQ ID NO:52), GHPO 1151 (SEQ ID NO:54), GHPO 1275 (SEQ ID NO:56), GHPO 1365 (SEQ ID NO:58), GHPO 1578 (SEQ ID NO:60), GHPO 22 (SEQ ID NO:62), GHPO 58 (SEQ ID NO:64), GHPO 200 (SEQ ID NO:66), GHPO 558 (SEQ ID NO:68), GHPO 563 (SEQ ID NO:70), GHPO 695 (SEQ ID NO:72), GHPO 699 (SEQ ID NO:74), GHPO 702 (SEQ ID NO:76), GHPO 709 (SEQ ID NO:78), GHPO 741 (SEQ ID NO:80), GHPO 762 (SEQ ID NO:82), GHPO

827 (SEQ ID NO:84), GHPO 852 (SEQ ID NO:86), GHPO 1013 (SEQ ID NO:88), GHPO 1020 (SEQ ID NO:90), GHPO 1031 (SEQ ID NO:92), GHPO 1052 (SEQ ID NO:94), GHPO 1127 (SEQ ID NO:96), GHPO 1149 (SEQ ID NO:98), GHPO 1176 (SEQ ID NO:100), GHPO 1250 (SEQ ID NO:102), GHPO 1312 (SEQ ID NO:104), GHPO 1358 (SEQ ID NO:106), GHPO 1490 (SEQ ID NO:108), GHPO 1559 (SEQ ID NO:110), GHPO 1651 (SEQ ID NO:112), GHPO 1726 (SEQ ID NO:114), GHPO 1780 (SEQ ID NO:116), GHPO 895 (SEQ ID NO:118), GHPO 1447 (SEQ ID NO:120), GHPO 28 (SEQ ID NO:122), GHPO 86 (SEQ ID NO:124), GHPO 155 (SEQ ID NO:126), GHPO 157 (SEQ ID NO:128), GHPO 237 (SEQ ID NO:130), GHPO 290 (SEQ ID NO:132), GHPO 293 (SEQ ID NO:134), GHPO 335 (SEQ ID NO:136), GHPO 374 (SEQ ID NO:138), GHPO 442 (SEQ ID NO:140), GHPO 480 (SEQ ID NO:142), GHPO 523 (SEQ ID NO:144), GHPO 610 (SEQ ID NO:146), GHPO 675 (SEQ ID NO:148), GHPO 690 (SEQ ID NO:150), GHPO 829 (SEQ ID NO:152), GHPO 850 (SEQ ID NO:154), GHPO 876 (SEQ ID NO:156), GHPO 984 (SEQ ID NO:158), GHPO 989 (SEQ ID NO:160), GHPO 1111 (SEQ ID NO:162), GHPO 1145 (SEQ ID NO:164), GHPO 1256 (SEQ ID NO:166), GHPO 1264 (SEQ ID NO:168), GHPO 1316 (SEQ ID NO:170), GHPO 1368 (SEQ ID NO:172), GHPO 1442 (SEQ ID NO:174), GHPO 1506 (SEQ ID NO:176), GHPO 1543 (SEQ ID NO:178), GHPO 1574 (SEQ ID NO:180), GHPO 1627 (SEQ ID NO:182), GHPO 1657 (SEQ ID NO:184), GHPO 1664 (SEQ ID NO:186), GHPO 1694 (SEQ ID NO:188), GHPO 1704 (SEQ ID NO:190), GHPO 1763 (SEQ ID NO:192), GHPO 616 (SEQ ID NO:194), GHPO 76 (SEQ ID NO:196), GHPO 109 (SEQ ID NO:198), GHPO 163 (SEQ ID NO:200), GHPO 169 (SEQ ID NO:202), GHPO 208 (SEQ ID NO:204), GHPO 219 (SEQ ID NO:206), GHPO 445 (SEQ ID NO:208), GHPO 479 (SEQ ID NO:210), GHPO 525 (SEQ ID NO:212), GHPO 535 (SEQ ID NO:214), GHPO 731 (SEQ ID NO:216), GHPO 836 (SEQ ID NO:218), GHPO 879 (SEQ ID NO:220), GHPO 881 (SEQ ID NO:222), GHPO 886 (SEQ ID NO:224), GHPO 893 (SEQ ID NO:226), GHPO 894 (SEQ ID NO:228), GHPO 976 (SEQ ID NO:230), GHPO 1011 (SEQ ID NO:232), GHPO 1024 (SEQ ID NO:234), GHPO 1084

(SEQ ID NO:236), GHPO 1329 (SEQ ID NO:238), GHPO 1330 (SEQ ID NO:240), GHPO 1346 (SEQ ID NO:242), GHPO 1360 (SEQ ID NO:244), GHPO 1388 (SEQ ID NO:246), GHPO 1411 (SEQ ID NO:248), GHPO 1419 (SEQ ID NO:250), GHPO 1446 (SEQ ID NO:252), GHPO 1469 (SEQ ID NO:254), GHPO 1501 (SEQ ID NO:256), GHPO 1505 (SEQ ID NO:258), GHPO 1522 (SEQ ID NO:260), GHPO 1525 (SEQ ID NO:262), GHPO 1615 (SEQ ID NO:264), GHPO 1689 (SEQ ID NO:266), GHPO 1733 (SEQ ID NO:268), GHPO 18 (SEQ ID NO:270), GHPO 139 (SEQ ID NO:272), GHPO 142 (SEQ ID NO:274), GHPO 250 (SEQ ID NO:276), GHPO 257 (SEQ ID NO:278), GHPO 325 (SEQ ID NO:280), GHPO 355 (SEQ ID NO:282), GHPO 357 (SEQ ID NO:284), GHPO 454 (SEQ ID NO:286), GHPO 475 (SEQ ID NO:288), GHPO 515 (SEQ ID NO:290), GHPO 527 (SEQ ID NO:292), GHPO 551 (SEQ ID NO:294), GHPO 602 (SEQ ID NO:296), GHPO 626 (SEQ ID NO:298), GHPO 646 (SEQ ID NO:300), GHPO 653 (SEQ ID NO:302), GHPO 655 (SEQ ID NO:304), GHPO 670 (SEQ ID NO:306), GHPO 739 (SEQ ID NO:308), GHPO 798 (SEQ ID NO:310), GHPO 1102 (SEQ ID NO:312), GHPO 1114 (SEQ ID NO:314), GHPO 1152 (SEQ ID NO:316), GHPO 1272 (SEQ ID NO:318), GHPO 1345 (SEQ ID NO:320), GHPO 1377 (SEQ ID NO:322), GHPO 1424 (SEQ ID NO:324), GHPO 1430 (SEQ ID NO:326), GHPO 1502 (SEQ ID NO:328), GHPO 1600 (SEQ ID NO:330), GHPO 1714 (SEQ ID NO:332), GHPO 359 (SEQ ID NO:334), GHPO 678 (SEQ ID NO:336), GHPO 708 (SEQ ID NO:338), GHPO 759 (SEQ ID NO:340), GHPO 847 (SEQ ID NO:342), GHPO 1050 (SEQ ID NO:344), GHPO 1101 (SEQ ID NO:346), GHPO 1120 (SEQ ID NO:348), GHPO 1138 (SEQ ID NO:350), GHPO 1310 (SEQ ID NO:352), GHPO 1320 (SEQ ID NO:354), GHPO 1375 (SEQ ID NO:356), GHPO 1432 (SEQ ID NO:358), GHPO 21 (SEQ ID NO:360), GHPO 282 (SEQ ID NO:362), GHPO 1089 (SEQ ID NO:364), GHPO 1141 (SEQ ID NO:366), GHPO 1280 (SEQ ID NO:368), and GHPO 1608 (SEQ ID NO:370); or

(ii) a derivative of said polypeptide.

9. The compound of claim 8, which is the mature form or a derivative of a polypeptide encoded by a DNA molecule of claim 4.
10. The compound of claim 8, which is the mature form or a derivative of a polypeptide encoded by a DNA molecule of claim 5.
11. A method of preventing or treating *Helicobacter* infection in a mammal, said method comprising administering to said mammal a prophylactically or therapeutically effective amount of a compound of claim 8.
12. The method of claim 11, further comprising administering an antibiotic, an antisecretory agent, a bismuth salt, or a combination thereof.
13. The method of claim 12, wherein said antibiotic is selected from the group consisting of amoxicillin, clarithromycin, tetracycline, metronidazole, and erythromycin.
14. The method of claim 12, wherein said bismuth salt is selected from the group consisting of bismuth subcitrate and bismuth subsalicylate.
15. The method of claim 12, wherein said antisecretory agent is a proton pump inhibitor.
16. The method of claim 15, wherein said proton pump inhibitor is selected from the group consisting of omeprazole, lansoprazole, and pantoprazole.
17. The method of claim 12, wherein said antisecretory agent is an H<sub>2</sub>-receptor antagonist.

18. The method of claim 17, wherein said H<sub>2</sub>-receptor antagonist is selected from the group consisting of ranitidine, cimetidine, famotidine, nizatidine, and roxatidine.

19. The method of claim 12, wherein said antisecretory agent is a prostaglandin analog.

20. The method of claim 19, wherein said prostaglandin analog is misoprostil or enprostil.

21. The method of claim 11, which further comprises administering a prophylactically or therapeutically effective amount of a second Helicobacter polypeptide or a derivative thereof.

22. The method of claim 21, wherein the second Helicobacter polypeptide is a Helicobacter urease, a subunit, or a derivative thereof.

23. A composition comprising a compound of claim 8, together with a physiologically acceptable diluent or carrier.

24. The composition of claim 23, further comprising an adjuvant.

25. The composition of claim 23, further comprising a second Helicobacter polypeptide or a derivative thereof.

26. The composition of claim 25, wherein said second Helicobacter polypeptide is a Helicobacter urease, or a subunit or a derivative thereof.



27. A method of preventing or treating *Helicobacter* infection in a mammal, said method comprising administering to said mammal a prophylactically or therapeutically effective amount of a polynucleotide of claim 1.

28. A method of preventing or treating *Helicobacter* infection in a mammal, said method comprising administering to said mammal a prophylactically or therapeutically effective amount of a polynucleotide of claim 4.

29. A method of preventing or treating *Helicobacter* infection in a mammal, said method comprising administering to said mammal a prophylactically or therapeutically effective amount of a polynucleotide of claim 7.

30. A composition comprising a viral vector, in the genome of which is inserted a DNA molecule of claim 3, said DNA molecule being placed under conditions for expression in a mammalian cell and said viral vector being admixed with a physiologically acceptable diluent or carrier.

31. The composition of claim 30, wherein said viral vector is a poxvirus.

32. A composition that comprises a bacterial vector comprising a DNA molecule of claim 3, said DNA molecule being placed under conditions for expression and said bacterial vector being admixed with a physiologically acceptable diluent or carrier.

33. The composition of claim 32, wherein said vector is selected from the group consisting of *Shigella*, *Salmonella*, *Vibrio cholerae*, *Lactobacillus*, *Bacille bilié de Calmette-Guérin*, and *Streptococcus*.

34. A composition comprising a polynucleotide of claim 1, together with a physiologically acceptable diluent or carrier.
35. The composition of claim 34, wherein said polynucleotide is a DNA molecule that is inserted in a plasmid that is unable to replicate and to substantially integrate in a mammalian genome and is placed under conditions for expression in a mammalian cell.
36. An expression cassette comprising a DNA molecule of claim 3, said DNA molecule being placed under conditions for expression in a procaryotic or eucaryotic cell.
37. A process for producing a compound of claim 8, which comprises culturing a procaryotic or eucaryotic cell transformed or transfected with an expression cassette of claim 36, and recovering said compound from the cell culture.
38. A method of preventing or treating *Helicobacter* infection in a mammal, said method comprising administering to said mammal a prophylactically or therapeutically effective amount of an antibody that binds to the compound of claim 8.